The Contribution of the NOAA/ETL Polarimetric Scanning Radiometer to AMSR/E Antarctic Sea Ice Experiment

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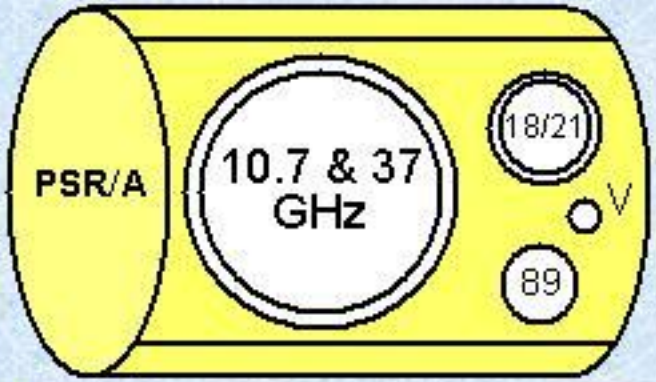
Polarimetric Scanning Radiometer contribution to AASI04

- Polarimetric Scanning Radiometer (PSR) system of the National Oceanic and Atmospheric Administration Environmental Technology Laboratory (NOAA/ETL) participated in AMSR/E Antarctic Sea Ice (AASI) campaign with two scanheads: PSR/CXI and PSR/A
- Joint use of the PSR/CXI and PSR/A matches the the frequency range capability of the AMSR/E satellite sensor
- Main task: High altitude (~22000') mapping of sea ice signatures in AMSR/E channels – testing the accuracy of the true ice cover as it is depicted by the mixing algorithm

PSR installation on NRL P-3

PSR/CXI PSR/A

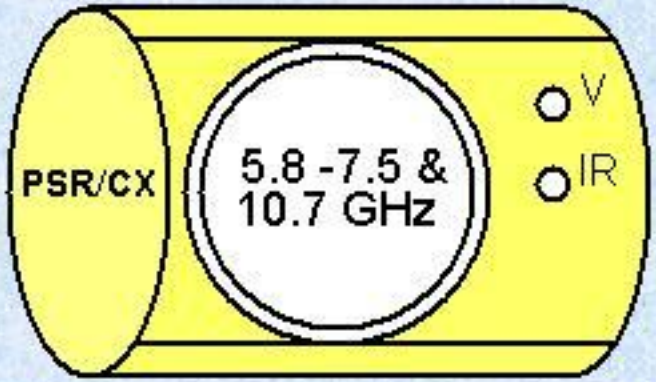


Scanhead Versions

Previous

Existing

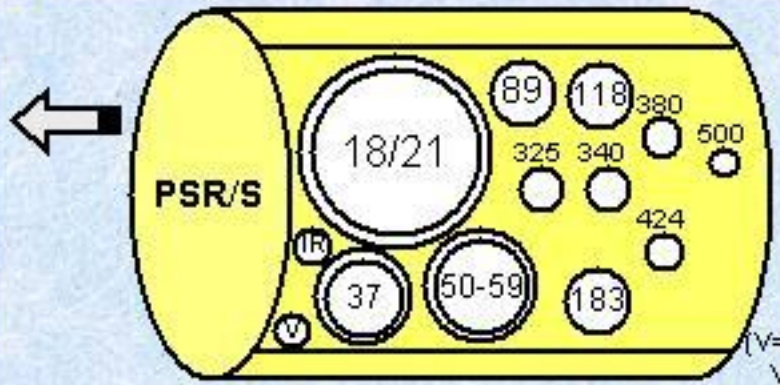
Currently in Development



PSR/A:			
1997 (D)	10.6-10.8	(v,h,U,V)	8°
1998 (A_1)	18.6-18.8	(v,h,U,V)	8°
2000 (A_2)	21.4-21.7	(v,h)	8° H_2O
2001 (A_3)	36-38	(v,h,U,V)	2.3°
	86-92	(v,h,U)	2.3°
	9.6-11.5 µm IR	(v+h)	7°

PSR/CX:			
1999 (C)	5.82-6.15	(v,h)	10°
	6.32-6.65	(v,h)	10°
	6.75-7.10	(v,h,U,V)	10°
	7.15-7.50	(v,h)	10°
2001 (CX)	10.6-10.8	(v,h,U,V)	7°
	10.68-10.70	(v,h)	7°
	9.6-11.5 µm IR	(v+h)	7°

PSR/S:			
~2001	18.6-18.8	(v,h,U,V)	7°
	21.4-21.7	(v,h)	7° H_2O
	36-38	(v,h,U,V)	7°
	52.6-57.5x7	(v)	3.5° O_2
	86-92	(v,h,U)	3.5°
	118.750 x 7	(v)	3.5° O_2
	183.310 x 7	(v)	1.8° H_2O
	325.153 x 3	(v)	1.8° H_2O
	337-343	(v,h,U)	1.8°
	380.197 x 5	(v)	1.8° H_2O
	424.763 x 5	(v)	3.5° O_2
	496-504	(v,h)	1.8°
	9.6-11.5 µm IR	(v+h)	1.8°

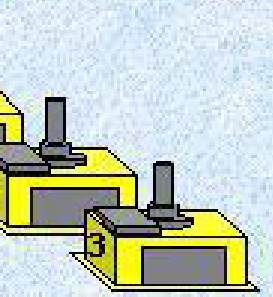


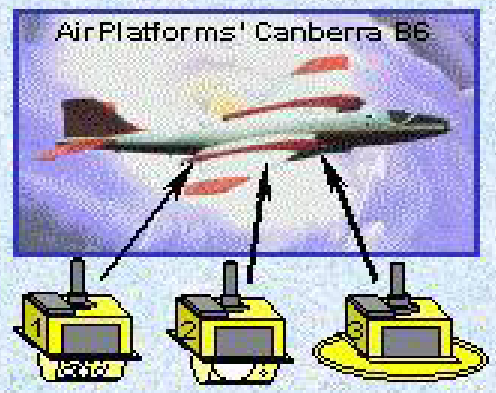
Polarimetric Scanning Radiometer

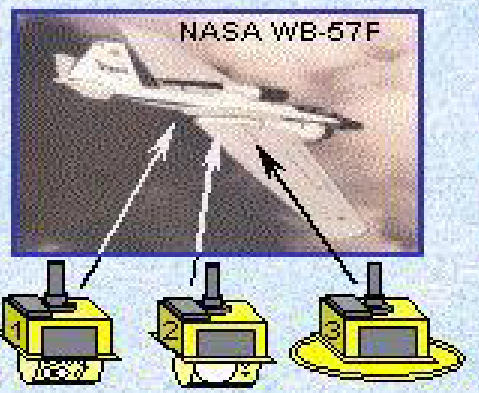
Compatible Series of Scanheads

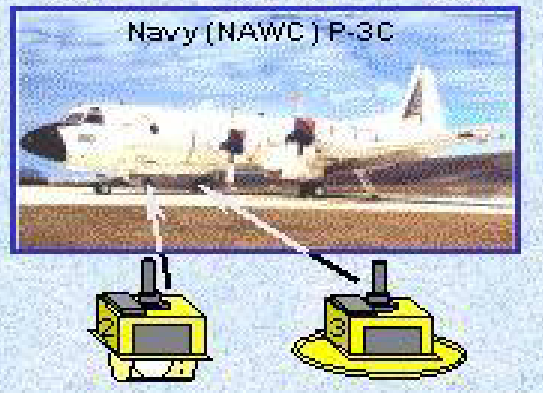
Channels • Polarizations • Beamwidths

PSR Platforms









		Canberra B6	WB-57F	P-3C
t /km):		30,000-55,000 (9-17 km)	30,000-65,000 (18-20 km)	500-30,000 (0.15-9 km)
mi):		2000 (3000/extended tanks)	2500	2400-3800
Endurance (hrs):		4.5 (6/extended tanks)	6	8-12
Operating Costs:		Medium	Medium	Medium
Restrictions:		Medium	Medium	Low
tion(s):		Bomb bay pallets*	Bomb bay pallets	Bomb bay fairing
# PSR Scanheads:		3 (2003*)	3 (2003*)	1 (2000), 2 (2002*)
Scan Modes:		Software-selectable conical, cross-track, along-track, nadir stare, and side view. Elevation angles from 0° to 70° WRT nadir. Attended or unattended operation. Synchronized scanning when using two or more scanheads.		
View: (horizon+35°)		Yes (60° roll)	Yes (60° roll)	Yes (60° roll)
cal Sensitivity:		1. High-Altitude Clouds & Precipitation 2. Surface to Lower Stratospheric Temperature & Moisture Profiles 3. Ocean & Land Surface		1. Ocean & Land Surface 2. Sea Ice 3. Low-Altitude Clouds & Precipitation
n	SSM/I & TMI	PSR/A		PSR/A
r	AMSR	PSR/A & PSR/CX -or- PSR/CX & PSR/S, & PSR/L		PSR/A & PSR/CX -or- PSR/CX & PSR/L
	AMSU-A/B	PSR/S -or- PSR/S & CX		PSR/S -or- PSR/S & CX
d	WindSat	PSR/A & PSR/CX		PSR/A & PSR/CX
	SSMIS	PSR/S & PSR/CX		PSR/S & PSR/CX
	ATMS	PSR/S -or- PSR/S & CX		PSR/S -or- PSR/S & CX
head	CMIS	PSR/S & PSR/CX -or- PSR/S & PSR/CX & PSR/L		PSR/S & PSR/CX -or- PSR/CX & PSR/L
on	GEM	PSR/S -or- PSR/S & PSR/CX -or- PSR/S & PSR/R		PSR/S -or- PSR/S & PSR/CX
entary Instruments:		AVAPS Dropsondes		C-Scat, Ku-Scat, PMS, ROWS, SRA, SAR, RAR, Dropsondes, AXCTDs ...

*Anticipated Performance or Capability

Mission Flights

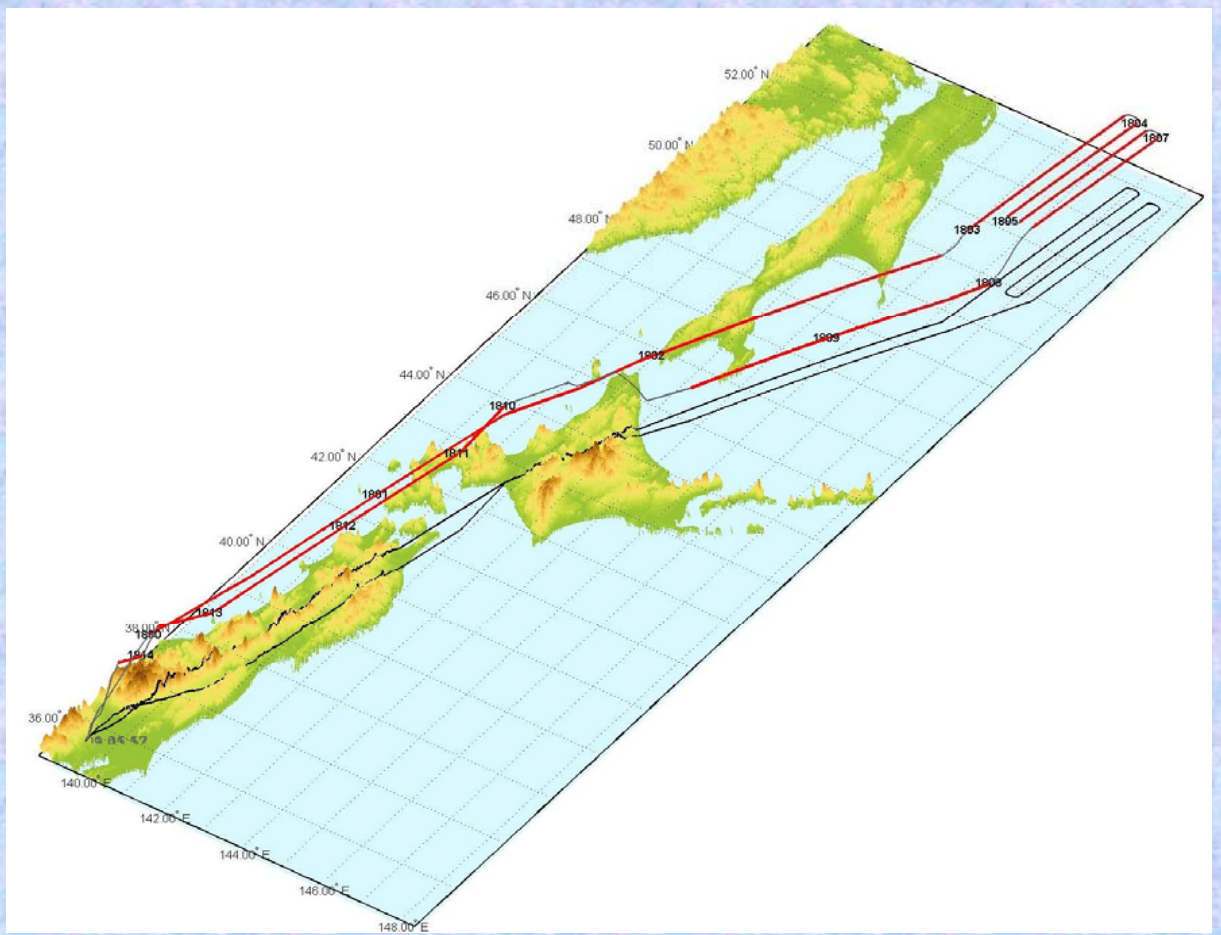
- See of Okhostsk 2003
- Bellingshousen Sea 2003

2004:

- Weddel Sea
- Bellingshousen Sea 1
- Bellingshousen Sea 2

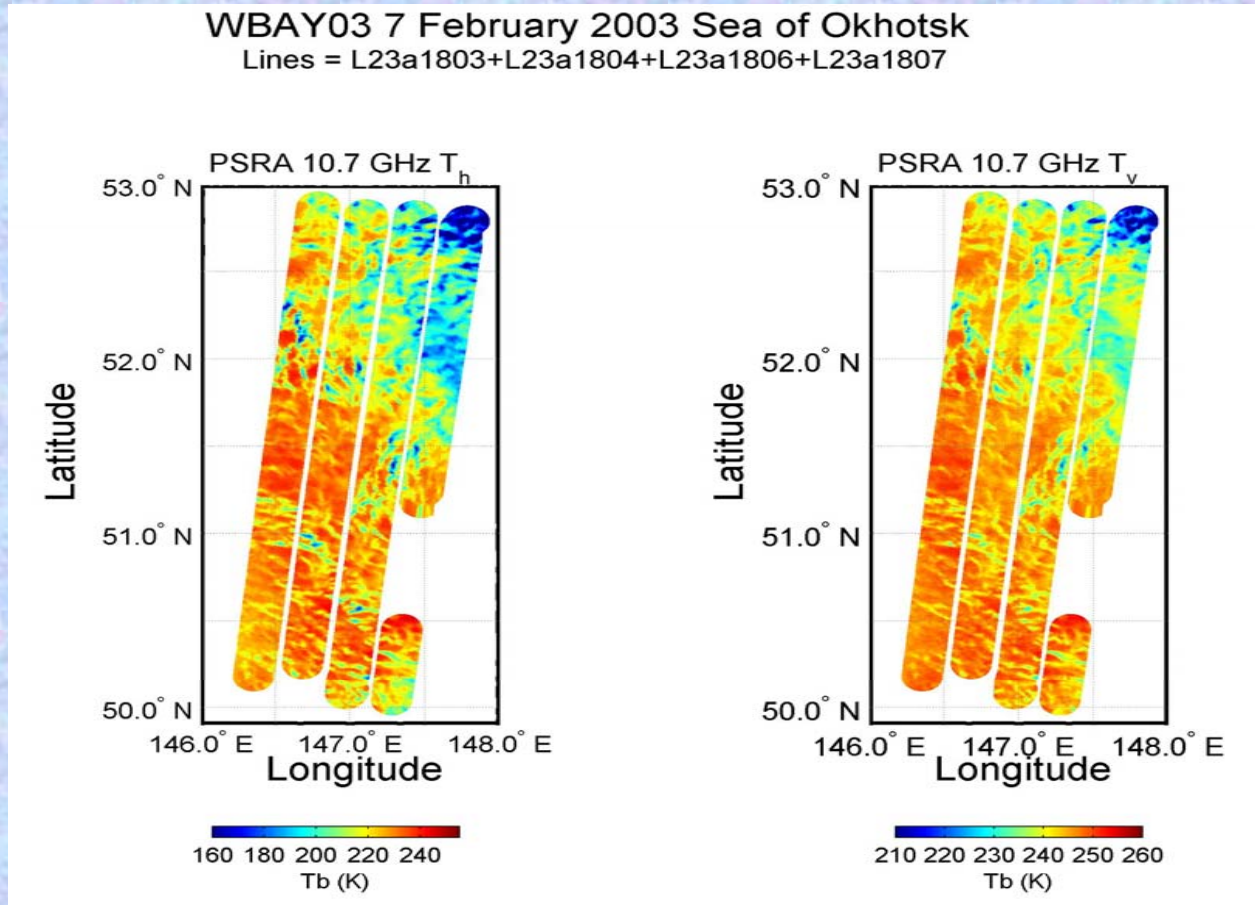
Sea of Okhotsk, February 7, 2003

Data processed and delivered



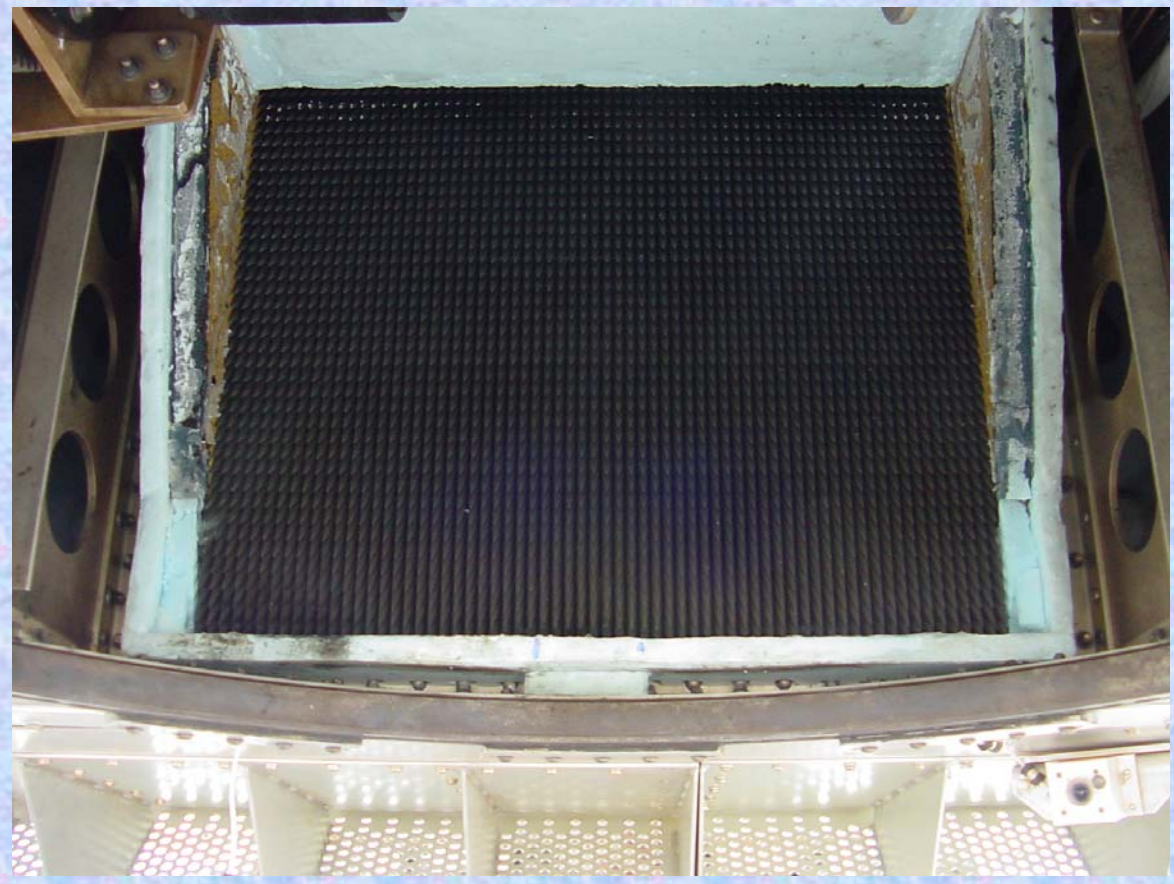
Sea of Okhotsk, February 7, 2003

10.7 GHz data – Level 2.3 T_B

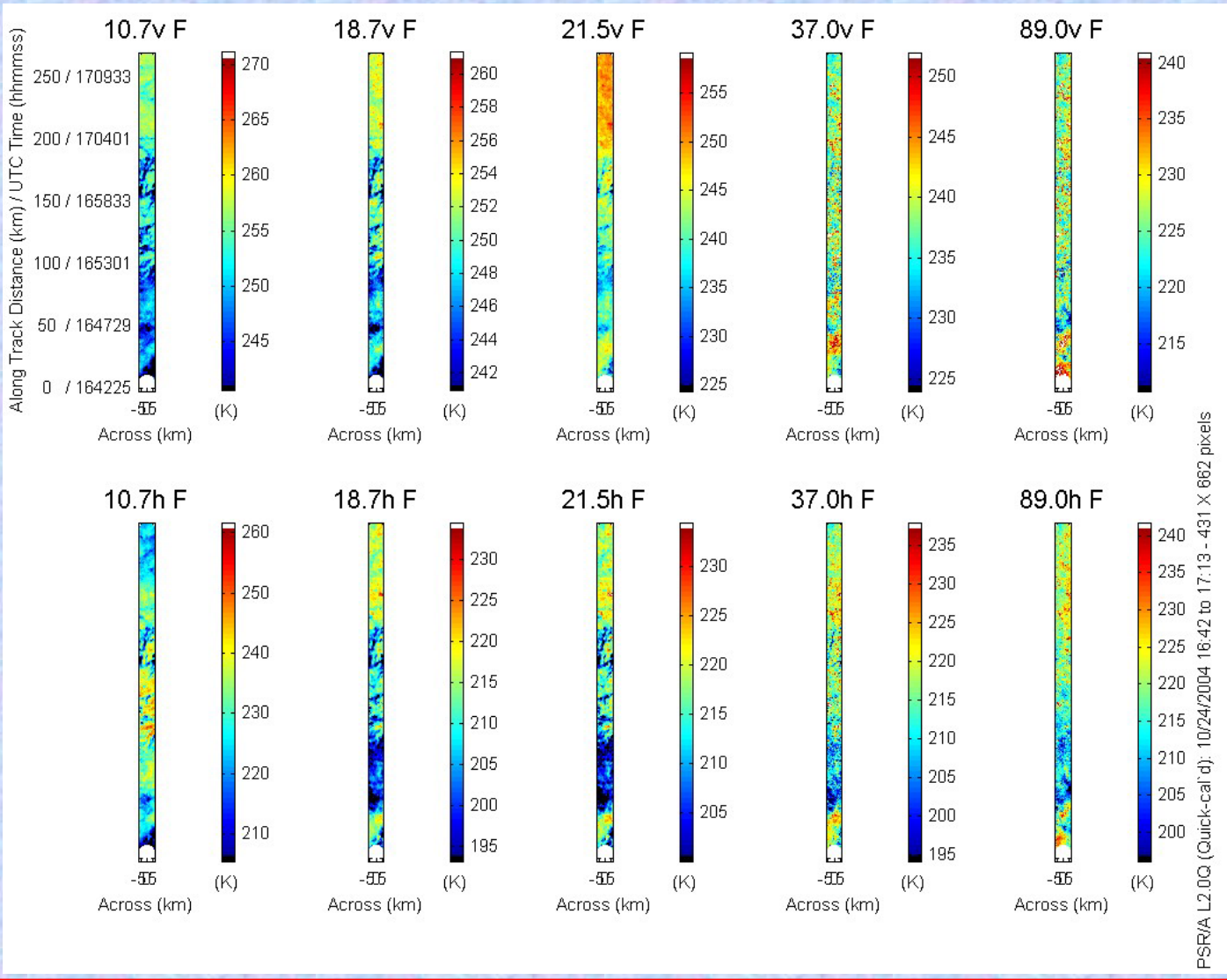


October 15, 2004

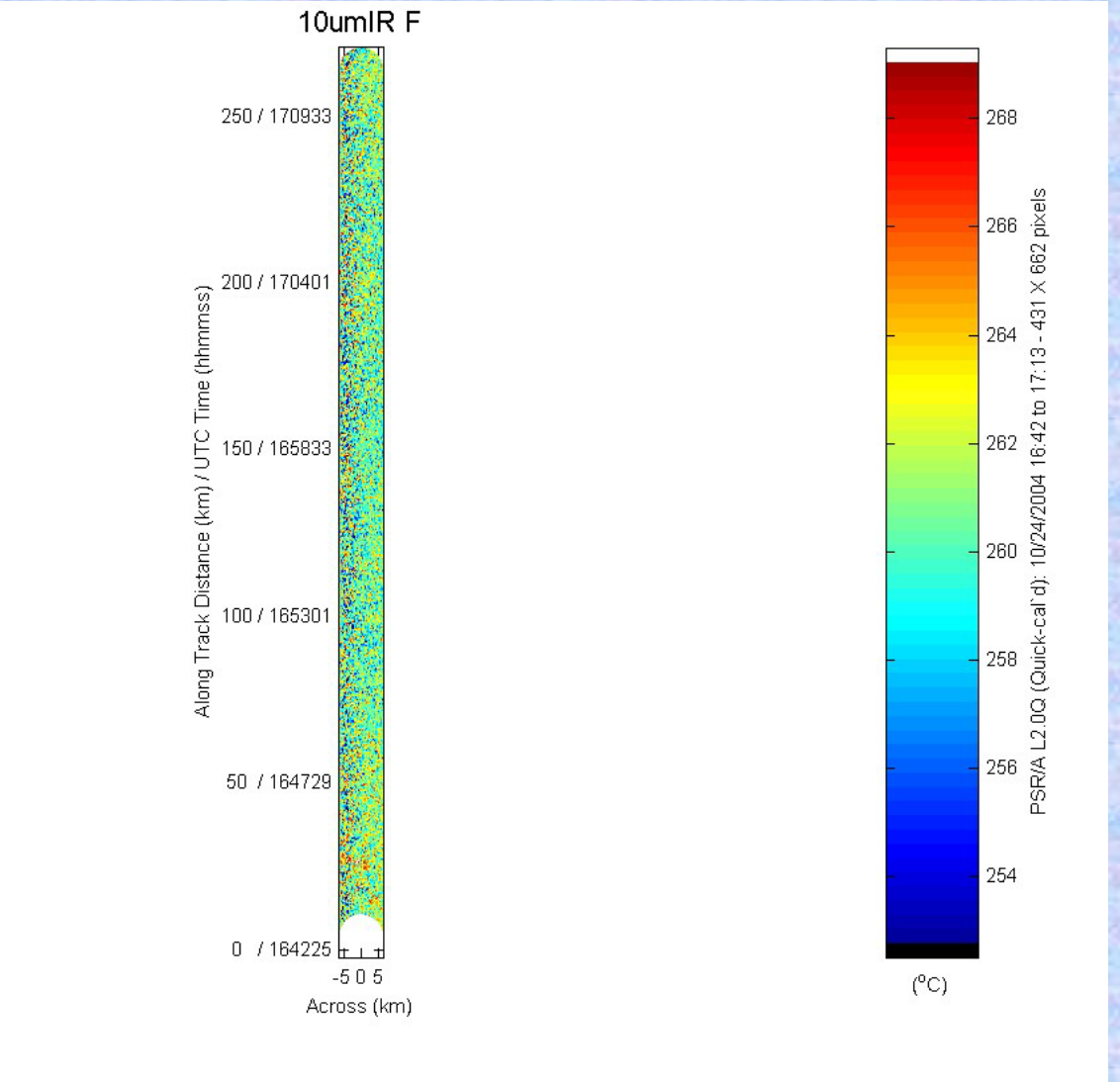
Approximatelly 16 minutes after take-off PSR lost foam on calibration target – no calibration possible.



NOAA PSR/A Imagery
Line 3, October 24, 2004



NOAA PSR/A Imagery
Line 3, October 24, 2004



NOAA PSR/A Imagery
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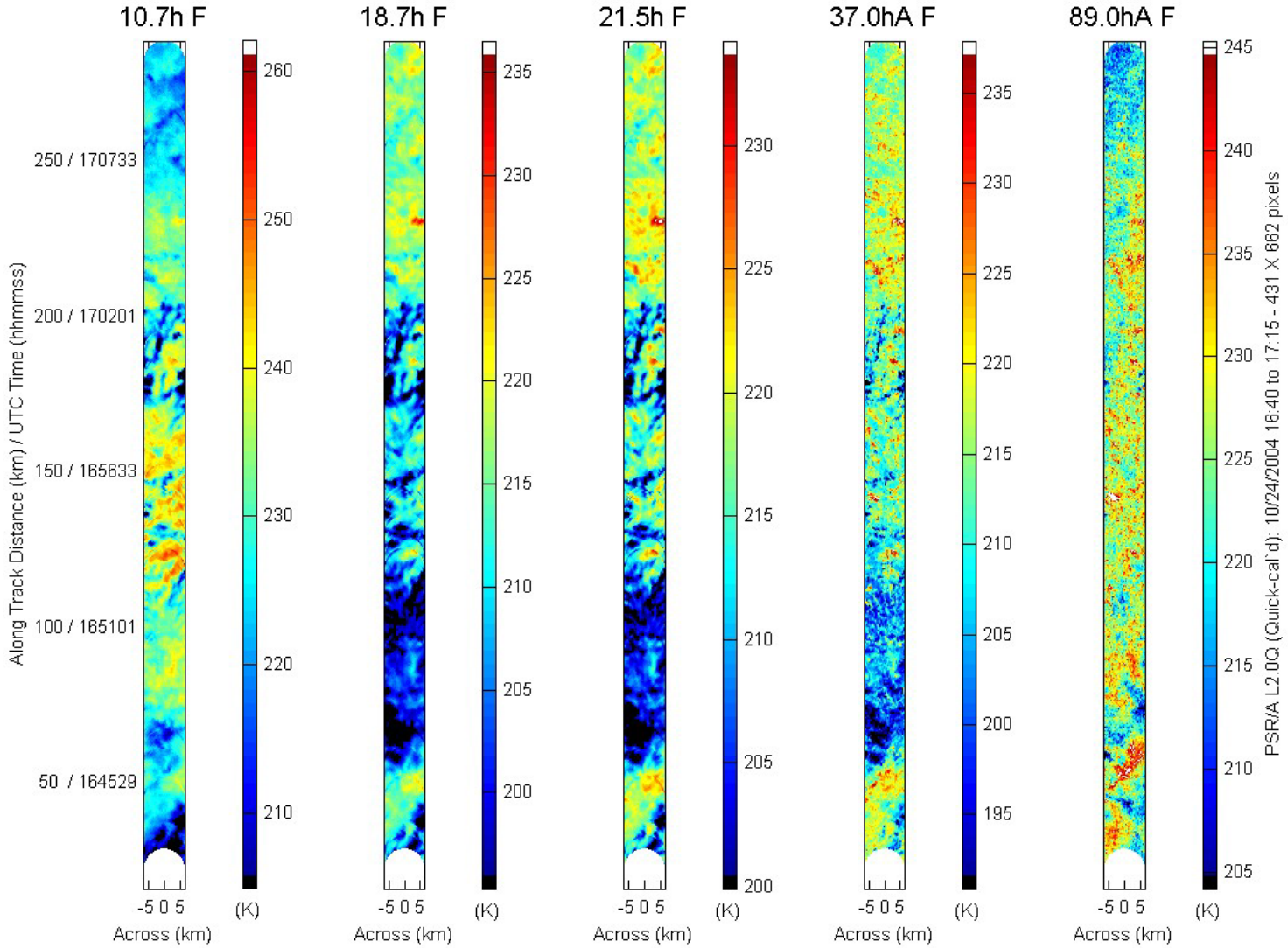
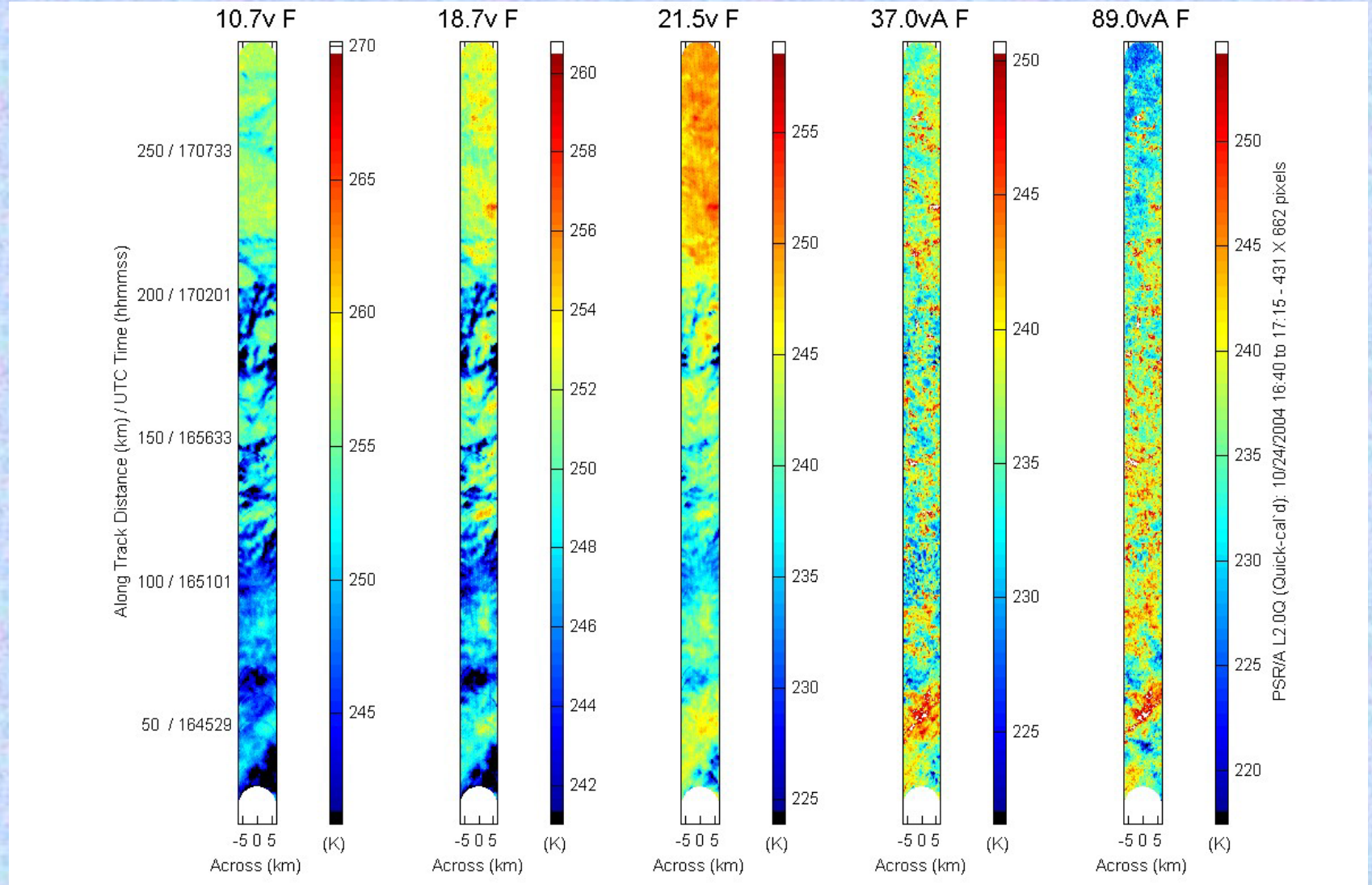
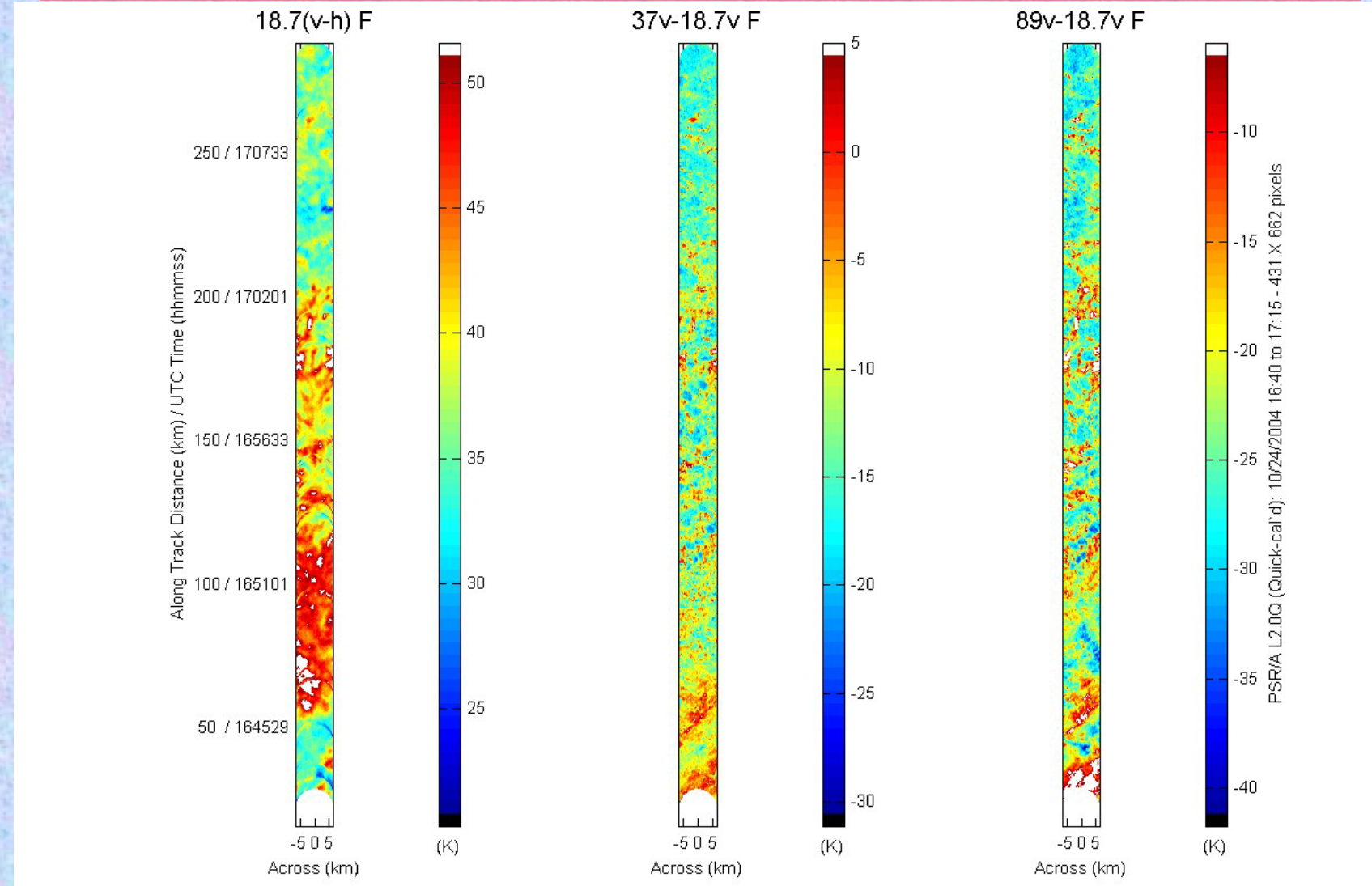


NOAA PSR/A Imagery
Line 3, October 24, 2004

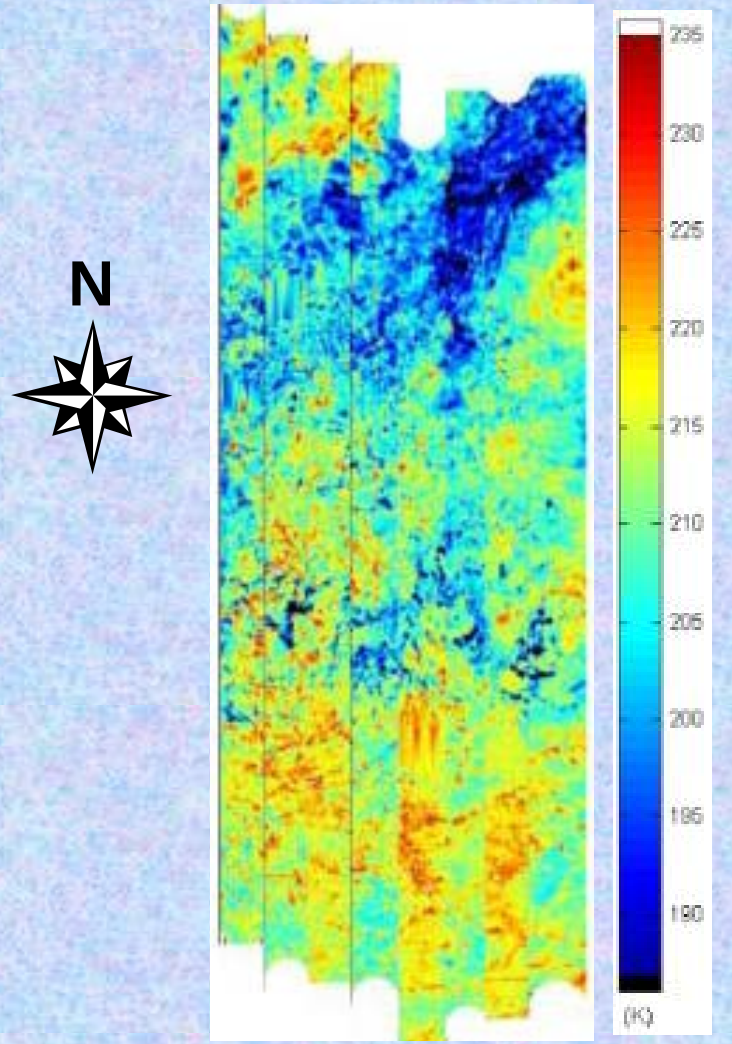


NOAA PSR/A Imagery
Line 3, October 24, 2004



37 GHz Horizontal T_B Map, October 24, 2004.

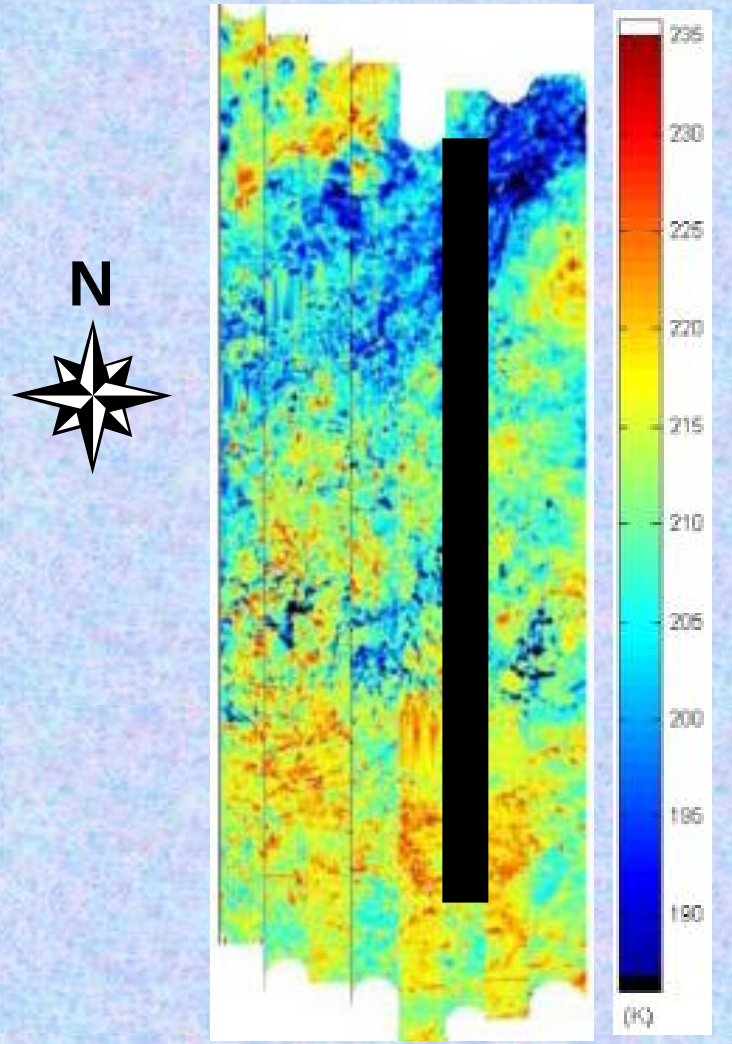
Forward Look



- Level 2.0Q PSR imagery
- Quick calibrated data
- Bellingshausen Sea
- No relocation, based just on features
- Data overlaid in image processing software
- Show very good agreement from one flightline to another
- All lines are front looks, there are some features that depends on the direction of observation
- Each line is ~36 minutes long

37 GHz Horizontal T_B Map, October 24, 2004.

Forward Look



Aircraft Attutide Information

- **PSR ARINC429 System failed – traced to faulty card**
- **Missing data in ATM attitude data record.**
- **E.g. at 18:22 UTC there is over 15 minutes gap in data**
- **Is it possible to include also GPS altitude in data stream?**

Summary

- PSR system flew two successful high-altitude missions in 2004: Weddell and Bellingshausen Sea
- Quick-look images from each flightline are available at: “:www.etl.noaa.gov/radiom”
- Calibration and data processing is in progress